A critical appraisal of "Improving gross motor function and postural control with hippotherapy in children with Down syndrome: Case reports"

By

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Abstract:

The goal of this paper was to critically appraise the article "*Improving gross motor function and postural control with hippotherapy in children with Down syndrome: Case reports."* A thorough breakdown of each section of the article determined that using hippotherapy as a therapeutic intervention potentially has many strengths, however it is accompanied by a number of weaknesses. One of the main limitations surrounding this field of study is the lack of existing literature on hippotherapy as an intervention in general, and its application for Down syndrome subjects even more so. The other big limitation was the small subject group and therefore lack of control group. These limitations were addressed and adjustments were made through the study to ensure accurate and reliable testing measures were performed. The researchers provided strength to the paper by being organized, very clear and detailed within each section, and adequately carrying the information through the entirety of the article. The hypothesis and aims of the study were clearly discussed through the article, the methods were organized and clearly described, and the supplemental graphs accurately depicted the results and outcomes of the intervention. This study showed that hippotherapy was an adequate intervention to improve gross motor function and increase postural control within Down syndrome children. Despite limitations, further studies could be performed using this study method to validate further the use of hippotherapy as a therapeutic intervention.

Key words: hippotherapy, Down syndrome, motor control, children

Introduction

Hippotherapy, though not a recently founded intervention, is not a commonly used therapy technique. Defined, hippotherapy is a therapeutic or rehabilitative treatment that uses horseback riding as a stimulus to improve coordination, balance and strength. Many times, hippotherapy is used for patients who have some kind of disability, such as cerebral palsy, autism, or Down syndrome and a majority of the clientele are children. I chose this topic, not only as a horse and child enthusiast, but because I feel that engaging with a horse during therapy can also allow for positive mental stimulation as well as physical. For a child, especially one with a mental disability, introducing an additional emotional connection with a horse engages the patient in a way that is difficult to achieve with general therapy methods. As well, the stimuli provided by hippotherapy allows the rider to work on moving balance and coordination during the gait-like motion provided by the horse, which is difficult to imitate in a clinical therapy setting. By appraising this study I hope to further validate hippotherapy as a therapeutic intervention. This concept lead to my clinical question being, “Is equine therapy more effective in promoting coordinated motor control and core strength in children with Down syndrome than typical physical therapy intervention?”

Methods

The first database I used was PubMed because of its reputation and tendency to have peer reviewed journals and direct access to many of those journals, making my research easier and more efficient. However, I soon realized that my subject was limited in PubMed and switched to using the ASU library and its vast selection of databases. I then limited my search to only the CINAHL database, in an attempt to narrow the results to those related to allied health

professions. I then limited my search further to only English articles. I also limited the search to include only those articles from 2010-2020 to incorporate more modern research. I tried to exclude adult only research studies as they may have a harder time improving with hippotherapy as they may have already developed certain motor patterns over the years. I used the keywords 'Hippotherapy and Down syndrome' for each database search. Using these limitations, I was able to narrow down my total hits to 40 entries before I began to review which articles I wanted to use for my appraisal.

This article came from the journal Physiotherapy Theory and Practice, 26(8):564-571, 2010. The authors of the article are Danielle Champagne, OT, Msc and Claude Dugas, PhD. The study was conducted through the Departement des science de l'activite physique, Universite du Quebec a Trois-Rivieres, Trois-Rivieres, Quebec, Canada. The therapy sessions themselves were conducted in both indoor and outdoor arenas and trails based on the weather, with the same horse being used for each session for both subjects. I chose this article over the other two I had picked out mainly because it answered my clinical question best. While I wanted to focus primarily on the effects of down syndrome, my second article included a spectrum of special needs subjects, and the third article included neuromotor function and bladder control which was less motor control than I was interested in. I confirmed my choice of articles due to the clarity, organization, and all-encompassing manner with which the authors presented their research and findings.

Results

Summary of the study

This article discusses a study involving two children with Down Syndrome and the impact that hippotherapy had on their motor and postural control. The children's measurements

were evaluated using the Gross Motor Function Measure (GMFM), which includes five progressive subsections of function. Accelerometer's were also used to compare the children's postural control while engaging in sessions. These were both measured in a pretest/posttest manner by two physiotherapists, one live and the other via videotape and blind to the other measurements. The sessions lasted about 30 minutes, for 11 weeks. The subjects engaged in therapeutic activities in three different positions upon the horse while walking. The GMFM results indicated an improvement in both subjects and were confirmed by both physiotherapists. The analysis of accelerometers showed increased postural stability in both subjects, though in different areas. The conclusion discusses how hippotherapy offers a unique stimulation unreachable through traditional therapy. It concluded by acknowledging that the small number of subjects limited the results, though the results remain a promising stepping stone for hippotherapy research.

Appraisal of the study introduction

This article's introduction had many strengths including a detailed description of the subject's background information and a clear explanation of hippotherapy benefits as a therapeutic intervention. It also clearly explained the means with which the research results would be quantified. Another strength was the acknowledgement that one of the measures used was created for cerebral palsy patients, but the authors used other literature to confirm that the measurement technique would be an appropriate tool for Down syndrome subjects as well. Overall, the introduction was well written, easily understood and clearly organized.

The weaknesses of the introduction were few, one of which concerning the lack of literature regarding hippotherapy and Down syndrome subjects. The other weakness that I found

was the lack of subjects used in the study, which in turn lead to the weakness of research void of a control group with which to compare results.

Appraisal of the study methods

The strengths of the methods sections included the same method of management of the subjects by the investigations. It was also clearly worded and with sufficient detail that the intervention could be easily replicated in future studies. The treatment used only one horse, the treatment time was discussed, as well as the detailed times the subjects spent in specific positions. Another strength included the accuracy and reliability of the measurement methods and data collection methods by both the accelerometers and the evaluators that were used for the treatment.

The weakness of the methods began with the research design being quasi-experimental. These designs can prove difficult to determine quality results. This leads to another weakness in the study, regarding the lack of subjects. Not only was there a lack of subjects, but there was also a lack of a control group. Though within-subject designs, such as this one, are useful, the lack of a baseline with a control group made it impossible to quantify the true amount of progress that was gained due to the hippotherapy alone.

Appraisal of the study results

The results section yielded many strengths, including the organization and clarity of the results themselves. The authors also addressed the research question in their results section, and clearly tied in their hypothesis and aims of the study. They were concise, accurate and inclusive off all of the results of the study, both in writing and in graph form. As well, statistically

speaking, the results of this study were significant in one of the testing measures, the GMFM. This intervention proved to be one that provided unique stimuli that typical clinics couldn't offer.

The results section did not hold many weaknesses. It was a significant weakness when the study did not report if the results of the accelerometry were deemed to be statistically significant or not. By design this intervention can offer unique stimuli, however it's difficult to attain without ready access to horses and it hasn't been able to be replicated with more traditional therapy techniques. As well, the authors didn't mention anything about minimally clinically important difference, eliminating the calculation of a 'need to treat' analysis which could have been very helpful for this intervention.

Appraisal of the study discussion

The discussion section's strengths involved the discussion of the meanings behind the results of the intervention. They were clear in what contributed to, or what potentially limited, significant improvements within the subjects and reflected the results. Another strength was the discussion by the authors of the limitations that were present during the study. As well, though it was limited, the authors were able to tie some of their findings to existing literature about balance and postural control with accelerometry and motor performance controls.

The weaknesses of the discussion section included the lack of existing literature on hippotherapy as an intervention for their specific population. As well, the literature that was available was fairly outdated, potentially making it lower quality. Other referenced literatures were from books, which could hold heavy biases regarding the intervention and its results. Lastly, the authors failed to discuss the potential clinical significance of the findings. Though

they discussed that hippotherapy's stimuli was difficult to replicate earlier, potential discussions for further studies for hippotherapy, or attempted recreations were never mentioned.

Discussion

The clinical significance of this study was that hippotherapy as an intervention provided a method to increase both motor and postural control with complex, sensory stimuli that is not easily attained in traditional therapy settings. It allows for new pathways to study neuronal stimulation in those with and without Down syndrome. This article was very relevant to my clinical question, as I asked if 'equine therapy would be more effective in promoting coordinated motor control and core strength in children with Down syndrome than typical physical therapy interventions' and this study included each part of my question.

I would argue in favor of using hippotherapy as it has the potential to not only provide attainment of motor and postural control and neural stimulation, but could also be an asset to those individuals who have difficulty interacting or who rapidly lose interest in menial tasks. On that same note, however, horses can be intimidating to some and it could be a serious risk to try and initiate treatment while the subject is fearful of the animal. However, I believe that the benefits of hippotherapy greatly outweigh the risks, as the risk of a subject being injured during a treatment is mitigated with proper safety measures. The article discusses how there are two side-walkers and one horse-handler to ensure control of the horse and safety of the subject at all time. I feel that the results of a larger sample size and broader range of subjects would strongly improve the argument for hippotherapy. The lack of literature overall can question the validity of the intervention methods.

I believe that, although there isn't much previous literature, the positive results of this study allow for the growth of confidence in the intervention. Despite the lack of subjects, the study was clearly organized and accurately depicted throughout the study in such that it would be easily replicated. I would consider using this intervention for future subjects and would feel safe doing so if the resources were available to me to utilize this intervention. I believe that the benefits of hippotherapy outweigh the risks and could be used to help a broad range of subjects with a wide range of impairments, both mental and physical.

This clinical appraisal determined that hippotherapy as an intervention, though successful in this study, has a long way to go to gain full credibility as being a successful therapy treatment. The authors of this study helped this cause as they were thorough, organized and descriptive with their methods and the outcomes of their study. There were many strengths, and the biggest limitation was the lack of literature and the limited number of subjects who have experienced a hippotherapy intervention. Overall, this study could be a stepping stone to further validating hippotherapy research as a clinically significant therapeutic intervention.